REMARKS

Claims 1-43 are pending in the current application. In an Office Action dated January 31, 2005 ("Office Action"), the Examiner rejected claims 1-6 under 35 U.S.C. § 103(a) as being obvious over Hoese et al., U.S. Patent No. 5,941,972 ("Hoese") in view of Walsh et al., U.S. Patent Publication No. 2002/0099972 A1 ("Walsh"), rejected claims 7-8 and 28-29 under 35 U.S.C. § 103(a) as being obvious over Hoese in view of Walsh or Bissessur et al., U.S. Patent No. 6,820,140 B2 ("Bissessur"), and rejected claims 9-14 and 30 under 35 U.S.C. § 102(b) as being anticipated by Hoese. The Examiner indicated that claims 15-27 and 31-43 would be allowable if rewritten in independent form.

Applicants' representative wishes to thank the Examiner for the conditional allowance of claims 15-27 and 31-43, but defers rewriting claims 15-27 and 31-43 in independent form until the arguments presented below have been considered by the Examiner. Applicants' representative respectfully traverses the 35 U.S.C. § 102(b) and 35 U.S.C. § 103(a) rejections of claims 1-14 and 28-30.

Applicants' representative addresses the rejections of the independent claims 1, 9, and 30, in that order. Claims 1 is provided below, for the Examiner's convenience:

> 1. (original) A storage shelf that contains a number of data-storage devices interconnected to a communications medium, the storage shelf including:
>
> a first storage-shelf-router integrated circuit and a last storage-shelf-router integrated circuit, each storage-shelf router integrated circuit including
>
> a first communications-medium port,
>
> a second communications-medium port,
>
> one or more processors,
>
> a number of disk-drive-link-port components that transmit data and commands to the number of data-storage devices through disk-drive links, and
>
> routing logic for routing commands received through the first and second communications-medium ports to the one or more processors and for routing data received through the two or more communications-medium ports to the number of data-storage-device-link-port components; and
>
> a number of path controller cards, each path controller card
>
> receiving data and commands transmitted through disk-drive links from the number of data-storage-device-link-port components of one of the two storage-shelf-router integrated circuits, and, following a failure of a disk-drive

link or data-storage-device-link port, receiving data and commands transmitted from one or more of the number of data-storage-device-link-port components of the other of the storage-shelf-router integrated circuits, and

transmitting the received data and commands to a data-storage device.

The claim is directed to a storage shelf. Storage shelves are described in great detail, beginning on page 33 of the current application, with reference to Figures 9-13C. A storage shelf (1010 in Figure 10 and 1100 in Figure 11) contains storage shelf routers (1014 and 1018 in Figure 10, 1102 and 1104 in Figure 11, 1322 and 1324 in Figure 13B) multiple mass storage devices (1022-1025 in Figure 10, 1108 in Figure 11), and path controller cards (1110 in Figure 11, Figures 14A-B), each associated with a mass storage device. Claim 1 clearly claims a storage shelf including two such storage-shelf routers, reciting first and second storage-shelf-router integrated circuits, a number of data-storage devices, and a number of path controller cards.

Claim 1 is rejected as being obvious over Hoese in view of Walsh. An even cursory reading of Hoese and Walsh reveals that neither Hoese nor Walsh are related to the claimed invention. Hoes discloses a storage router that "routes requests from initiator devices on one medium to target devices on the other medium and routes data between the target and initiator" (Hoese, column 3, lines 35-37). Hoese's storage router is shown in Figures 4 and 5, and described beginning at line 66 of column 4 to line 24 of column 6. Hoese's storage router is not an integrated circuit, as Applicants' storage-shelf-router is clearly claimed to be in claim 1. Integrated circuits are not rack mounted or free standing devices (Hoese, column 5, lines 5-53). Hoese's storage router is not included in a storage shelf, and Hoese makes no mention of suggestion of a storage shelf, instead describing networked workstations and standalone storage devices. Moreover, while multiple storage-shelf-routers are included in the storage shelf claimed in claim 1, for fault tolerance, as described in detail in the current application, Hoese describes only a single storage router within a system of interconnected workstations and standalone data storage devices.

The storage-shelf routers of the currently claimed storage shelf are each clearly claimed to include a first communications port, a second communications port,

through which the storage-shelf router receives commands and data, as well as "a number of disk-drive-link-port components that transmit data and commands to the number of data-storage devices through disk-drive links." As easily seen in Figure 10 of the current application, storage router 1018 is connected to two FC communications media 1016 and 1020 and multiple disk-drive links, including disk-drive link 1028. Hoese's storage router contains only an FC controller and a SCSI controller (52 and 54 in Figure 4 of Hoese). The storage-shelf routers of the currently claimed storage shelf include "routing logic for routing commands received through the first and second communications-medium ports to the one or more processors and for routing data received through the two or more communications-medium ports to the number of data-storage-device-link-port components." Hoese's storage router cannot possibly have anything related to this routing logic, lacking the two communications ports and data-storage-device-link-ports, and instead merely acting as "a bridge device that connects a Fibre Channel directly to a SCSI bus" (Hoese, column 5, lines 26-30). There is simply no correspondence between the storage shelf claimed in claim 1 and anything disclosed, mentioned, or suggested in Hoese.

Walsh is equally unrelated to the storage shelf claimed in claim 1. The Examiner apparently cites Walsh against the "number of path controller cards" elements of claim 1, each of which receives "data and commands transmitted through disk-drive links from the number of data-storage-device-link-port components of one of the two storage-shelf-router integrated circuits, and, following a failure of a disk-drive link or data-storage-device-link port," receives "data and commands transmitted from one or more of the number of data-storage-device-link-port components of the other of the storage-shelf-router integrated circuits," and transmits "the received data and commands to a data-storage device." Walsh discloses a network router in which a number of switch cards are connected to multiple networks in order to route messages between the two networks. The Examiner cites Walsh's router control processors ("RCP") (102a-b in Figure 1 of Walsh) as storage-shelf-router integrated circuits, but they bear no resemblance to the currently claimed storage-shelf-router integrated circuit, and are, in fact, printed circuit cards (Walsh, page 2, paragraph [0027]) rather than integrated

circuits. As described in paragraph [0029] of Walsh, the RCP cards "each include a processor that executes programs out of a memory to perform integrity checking of the respective card and to control the transmission of configuration information to the respective Line Cards over the control plane." They do not route data and commands to path controller cards associated with mass storage devices. They do not have two communications ports and a number of disk-drive-link-port components that transmit data and commands to a number of data-storage devices through disk-drive links. The Examiner cites Walsh's bridge hotswap cards ("BHC") (104a-b) as path control cards, but, again, they bear no relation to the claimed path controller cards of claim 1. As discussed in paragraph [0035] of page 3 of Walsh, the BHC cards are simply network bridge cards.

The Examiner states: "It would have been obvious to one having skill in the art to utilize the teachings of redundant router integrated circuits and path controller cards card of Walsh in order to provide a reliable control plane in case of failure of any single component of the control plane as taught by Walsh." Applicants' representative cannot comprehend what it is that the Examiner is suggesting as a justification fro combining Walsh and Hoese. Hoese neither discloses, mentions, nor suggests control planes, router integrated circuits, or anything else related to either Walsh or to the currently claimed invention. Redundant control planes are certainly useful for Walsh's network router, but have nothing whatsoever to do with Hoese's storage router network bridge, which is not describes by Hoese as having a control plane.

Bissessur is later cited for the proposition that an ATA disk can be accessed via an FC controller. Indeed, in Bissessur, an FC controller is shown to access an SATA controller via a bus. This, however, has nothing at all to do with storage shelves, storage-shelf-router integrated circuits, or anything else claimed in claim 1.

Claim 9 is next provided below for the Examiner's convenience:

> 9. (original) A storage-shelf-router integrated circuit employed within a storage shelf that contains a number of data-storage devices interconnected to two communications media, the storage-shelf-router integrated circuit including:
>
> a first communications-medium port;
>
> a second communications-medium port;

one or more processors;

a number of data-storage-device-link-port components that transmit data and commands to the number of data-storage devices through disk-drive links; and

routing logic for routing commands received through the first and second communications-medium ports to the one or more processors and for routing data received through the two or more communications-medium ports to the number of data-storage-device-link-port components.

Claim 9 claims the storage-shelf-router integrated circuit employed within a storage shelf, using language similar to the language of claim 1 related to the storage-shelf-router integrated circuit elements of claim 1. As discussed above, neither Hoese, nor Walsh, nor Bissessur disclose, mention, or suggest a storage shelf or a storage-shelf-router integrated circuit. No cited reference discloses, mentions, or suggests any kind of integrated circuit implementation of a routing component, and nothing mentioned in the cited references routes data and commands between two communications ports and multiple data-storage-device-link ports. For the reasons discussed above with respect to claim 1, no cited reference, alone or in combination with either or both of the other cited references, teaches or suggests anything related to storage shelves, storage-shelf routers, or integrated-circuit implementations of any kind of router.

Claim 30 is next provided below for the Examiner's convenience:

30. (original) A routing logic component within a local storage-shelf router, included within a storage shelf, that includes a first port to a first communications medium, a second port to a second communications medium, a command and error processing component, and a data-storage-link-port layer, the routing logic component comprising:

destination logic that determines whether a message received from one of the first port and the second port is directed to the local storage-shelf-router, to a remote storage shelf router intercommunicating with the local storage router, or to a remote entity external to the storage shelf; and

routing logic that routes a message received from one of the first port and the second port to one of the first port and second port in order to forward the message to a remote storage-shelf router when the destination logic determines that the message is directed to the remote storage-shelf router, that routes a message received from one of the first port and the second port to one of the first port and second port in order to forward the message to a remote entity external to the storage shelf when the destination logic determines that the message is directed to the remote entity external to the storage shelf, and that routes the message received from one of the first port and the second port to one of the

> command and error processing component or to the data-storage-link-port layer when the destination logic determines that the message is directed to the local storage-shelf router.

Claim 30 claims the routing logic component within a storage-shelf-router integrated circuit employed within a storage shelf, using language similar to the language of claim 1 related to the storage-shelf-router integrated circuit elements of claims 1 and 9. As discussed above, neither Hoese, nor Walsh, nor Bissessur disclose, mention, or suggest a storage shelf or a storage-shelf-router integrated circuit. No cited reference discloses, mentions, or suggests any kind of integrated circuit implementation of a routing component, and nothing mentioned in the cited references routes data and commands between two communications ports and multiple data-storage-device-link ports. There can be nothing related to the claimed routing logic in the cited references, because no component mentioned in the cited references routes data and commands between two communications ports and multiple data-storage-device-link ports.

Because none of the cited references are related to the storage shelf claimed in independent claim 1, the storage-shelf-router integrated circuit claimed in claim 9, or the routing logic component of a storage-shelf router claimed in claim 30, the independent claims 1, 9, and 30 are neither anticipated nor made obvious by any of the cited references, alone or in combination with one another. Because the cited references are not related to, and neither anticipate nor make obvious, independent claims 1, 9, and 30, they also neither anticipate nor make obvious any of the dependent claims that depend from claims 1, 9, and 30.

Applicants' representative does not wish to appear to be unnecessarily strident or argumentative, but responding to Office Actions represents a significant expense for a client, and such expense and efforts are far more justifiable and usefully applied when rejections in Office Actions cite relevant references. In the current case, Hoese discloses a simple network bridge, Walsh discloses a network router, and Bissessur discloses a bus interconnection between an FC controller and an SATA controller. These references are not related to storage shelves and storage-shelf routers disclosed and claimed in the current application. Applicants' representative respectfully invites the Examiner to re-read the current application, including overview material cited above with regard to storage shelves, in order to better understand the current claims. Again, a simple comparison of the interconnections of the storage shelf router in Figure 10 to two different FC media and multiple data-storage-device links should convince the Examiner that the currently claimed storage shelf and storage shelf router are far different in structure and function than anything discussed or mentioned in any of the cited references.

In Applicant's representative's opinion, all the claims remaining in the current application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,
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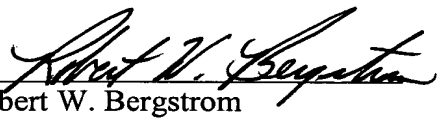

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